Ring Around The Collar: Update on EMS C-Spine Management

David Persse, MD

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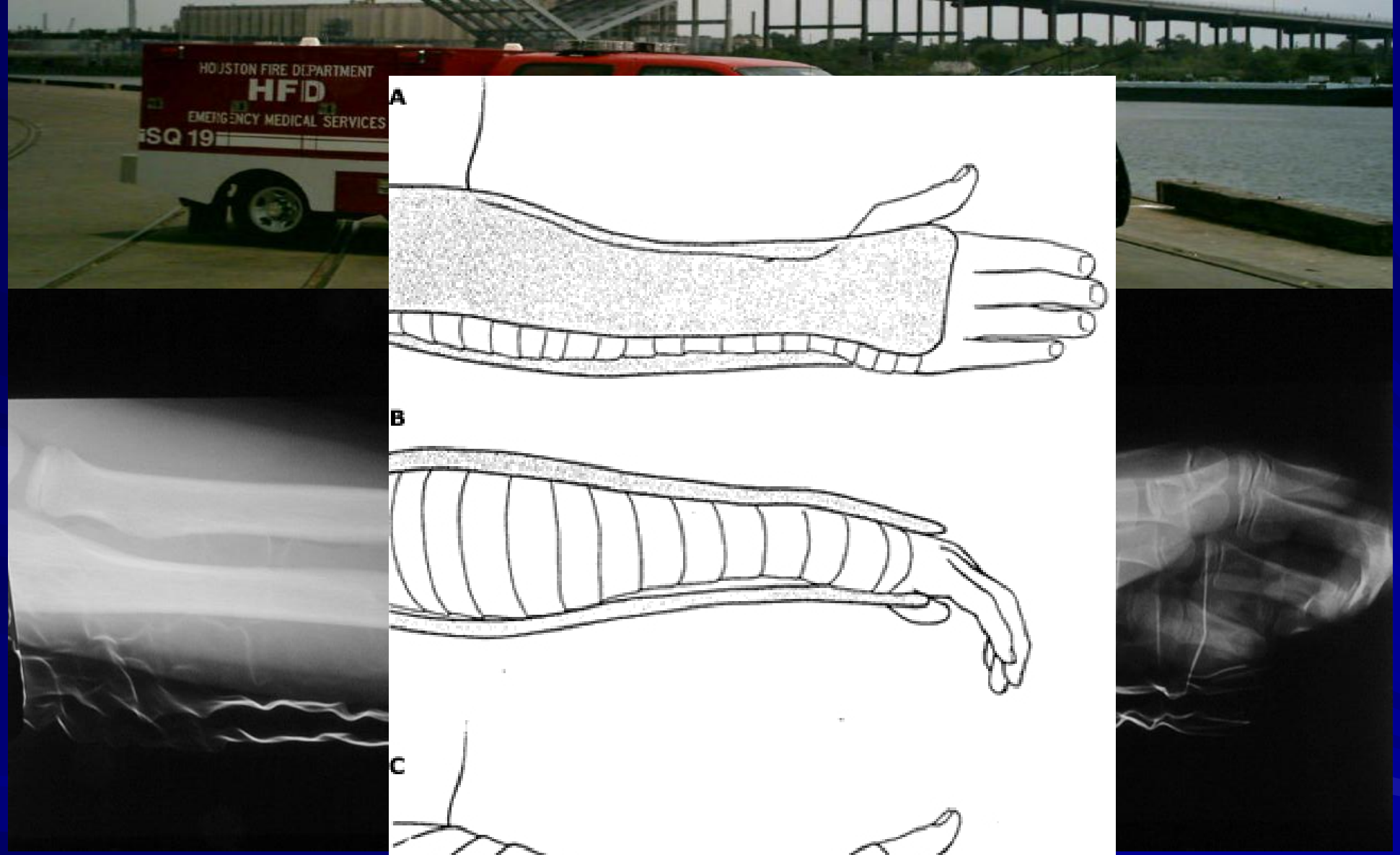
- ~14,000 New Spinal Cord Injuries /yr.
- 4-5,000 Die During Initial Event

- $417,000 first year expenses
- Lifetime Costs….? Million

- Morbidity/Mortality Induced by Care Givers?
  - "….25%"
- Toscano J. Prevention of neurological deterioration before admission to a spinal cord injury unit. Paraplegia. 1988 Jun;26(3):143-50. Department of Surgery, Austin Hospital, Melbourne, Australia.
- Podolsky S, et al. Efficacy of cervical spine immobilization methods. J Trauma. 1983 Jun;23(6):461-5.

- Indications for Cervical Spine Immobilization:
  - Clinical Signs and Symptoms
  - Mechanism of Injury
- NEXUS Study
  - Highly Reliable Criteria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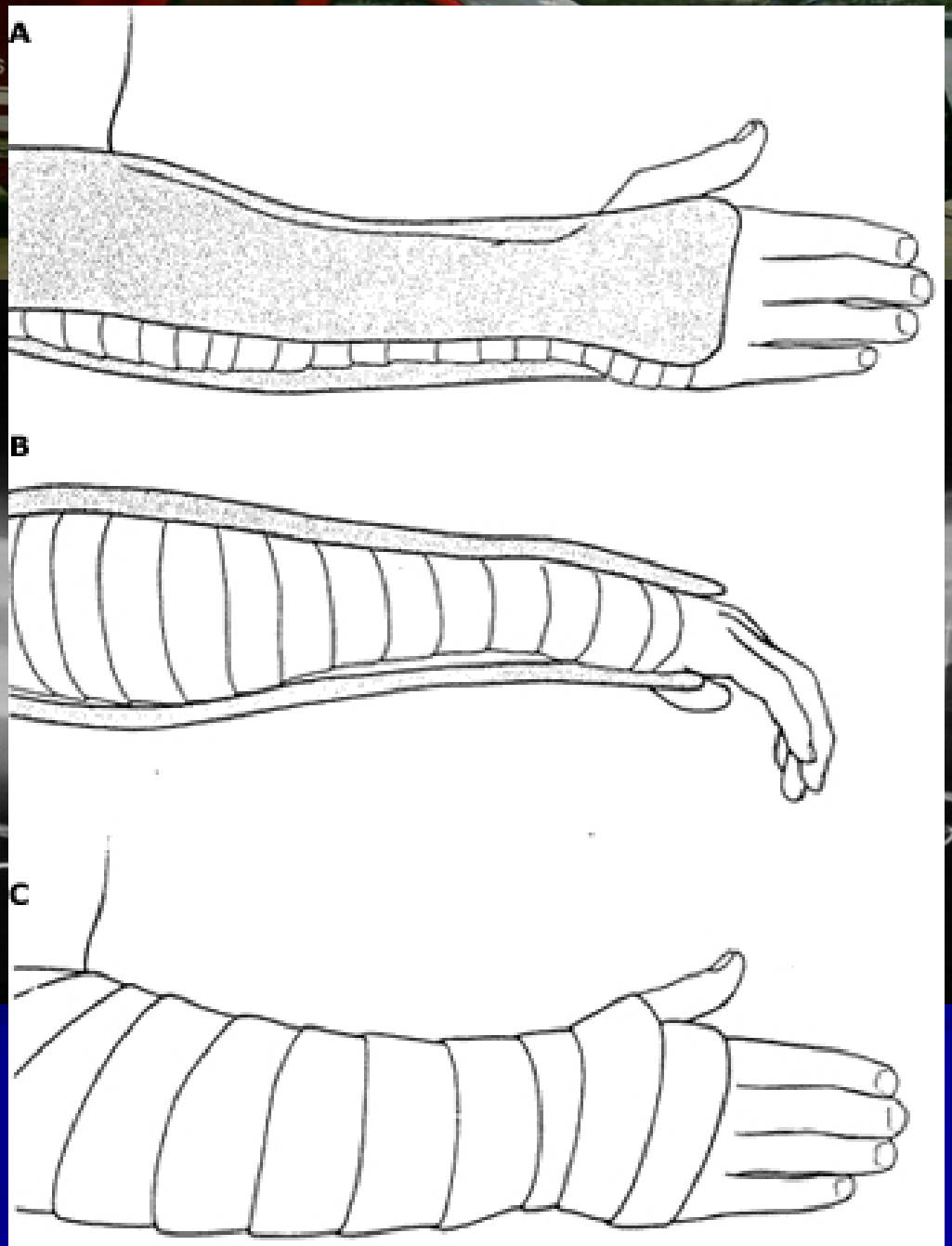

A
B
C

Immobilization Concept

Literature

Spinal immobilisation for trauma patients (Review)

Kwan I, Bunn F, Roberts I, on behalf of the WHO Pre-Hospital Trauma Care Steering Committee

THE COCHRANE COLLABORATION®

2001

Authors' co

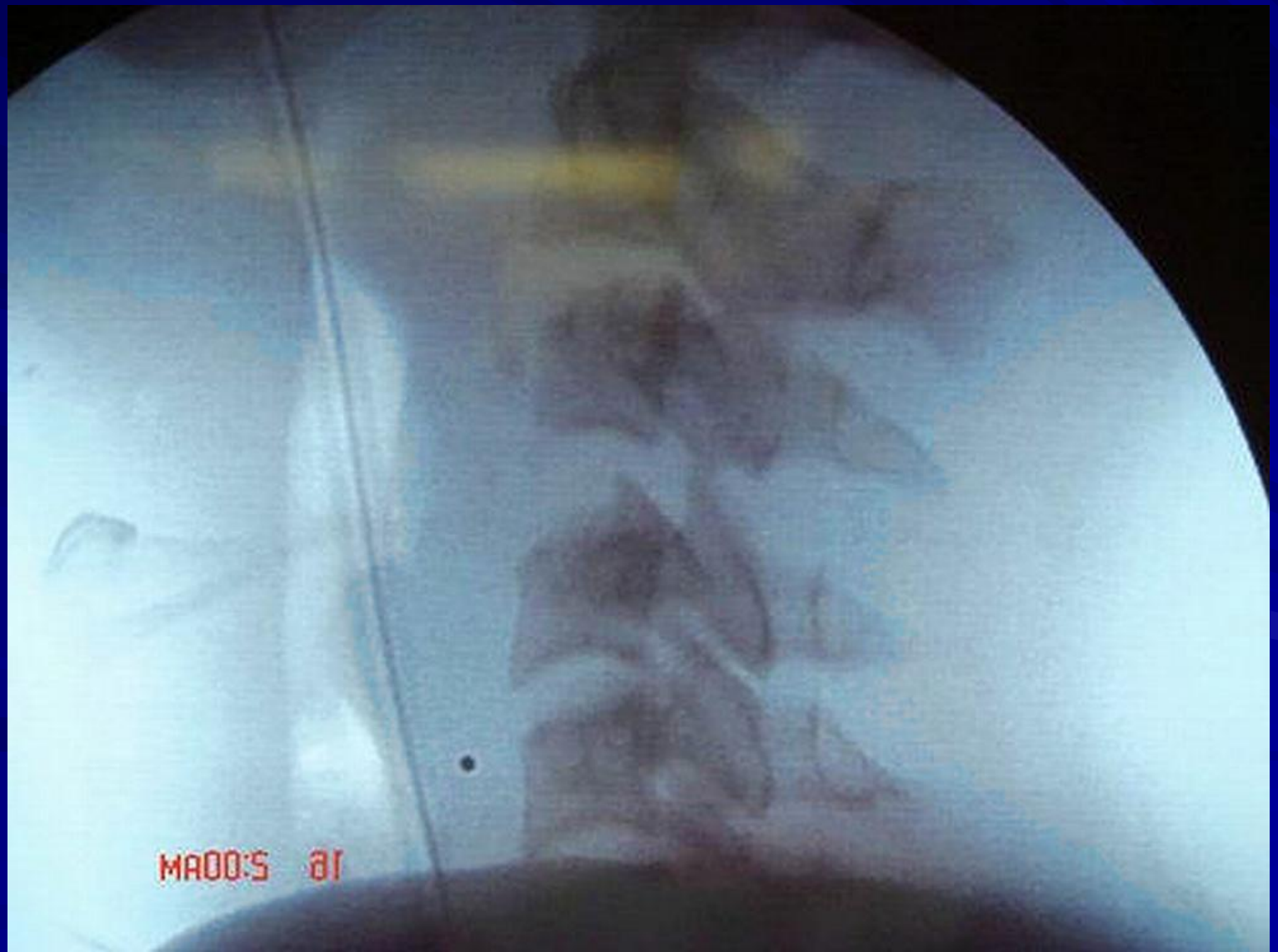
We did not The effect of spinal immobilisation on mortality, on mortality, neurological neurological injury, spinal stability and adverse effects in trauma patients remains uncertain. on is a major cause of preventable death in trauma patients, and spinal immobilisation, particularly of the cervical spine, can contribute to airway compromise, the possibility that immobilisation may increase mortality and morbidity cannot be excluded. Large prospective studies

- Hauswald M, Ong B, Tandberg D, et al. Out-of-hospital spinal immobilization: Its effect on neurologic injury. Acad Emerg Med 1998;5:214-219.

- All Blunt Traumatic Spinal Cord Injuries to Univ of New Mexico or University of Malaysia.
- UNM – ALL patients were spinal immobilized in the field
- Univ Malaysia – NO patients were spinal immobilized in the field

- RESULTS:
  - "There was less neurologic disability in the unimmobilzed Malaysian patients (OR 2.03; 95%CI 1.03-3.99; p=0.04). This corresponds to a <2% chance that immobilization has any beneficial effect."

Mandible Injury



Rapid Deceleration Injury

High Cervical Dissociation

- Alker GJ, et al. **Postmortem radiology of head neck injuries in fatal traffic accidents.** Radiology. 1975 Mar;114(3):611-7.
  - 21% of Victims of MVC had neck injuries, most at craino-cervical junction.
- **Bucholz RW, et al. Occult cervical spine injuries in fatal traffic accidents.** J Trauma. 1979 Oct;19(10):768-71.
  - 24% of victims of MVC had fatal neck injuries, most dislocations at the atlanto-occipital junction.

- Chaput CD, et al. **Survival of Atlanto-Occipital Dissociation Correlates With Atlanto-Occipital Distraction, Injury Severity Score, and Neurologic Status.** J Trauma. 2010 Dec 31. [Epub ahead of print]

  - 1174 Trauma Admissions, 2005-2009.
  - 14 High Cervical Injury, 6 Died

- **Dreiangel et al.** Occipitocervical dissociative injuries: common in blunt trauma fatalities and better detected with objective computed tomography-based measurements **The Spine Journal** Volume 10, Issue 8, August 2010, Pages 704-707
- 74 patients who expired w/in 21 days of admission and had CT exams
- On review of CT's:
  - 37 (50%) had one or more major c-spine injury
  - ONLY ONE WAS DIAGNOSED BEFORE DEATH!

Hypothesis:
collar creates distraction ?


100% X-RAY TRANSLUCENT

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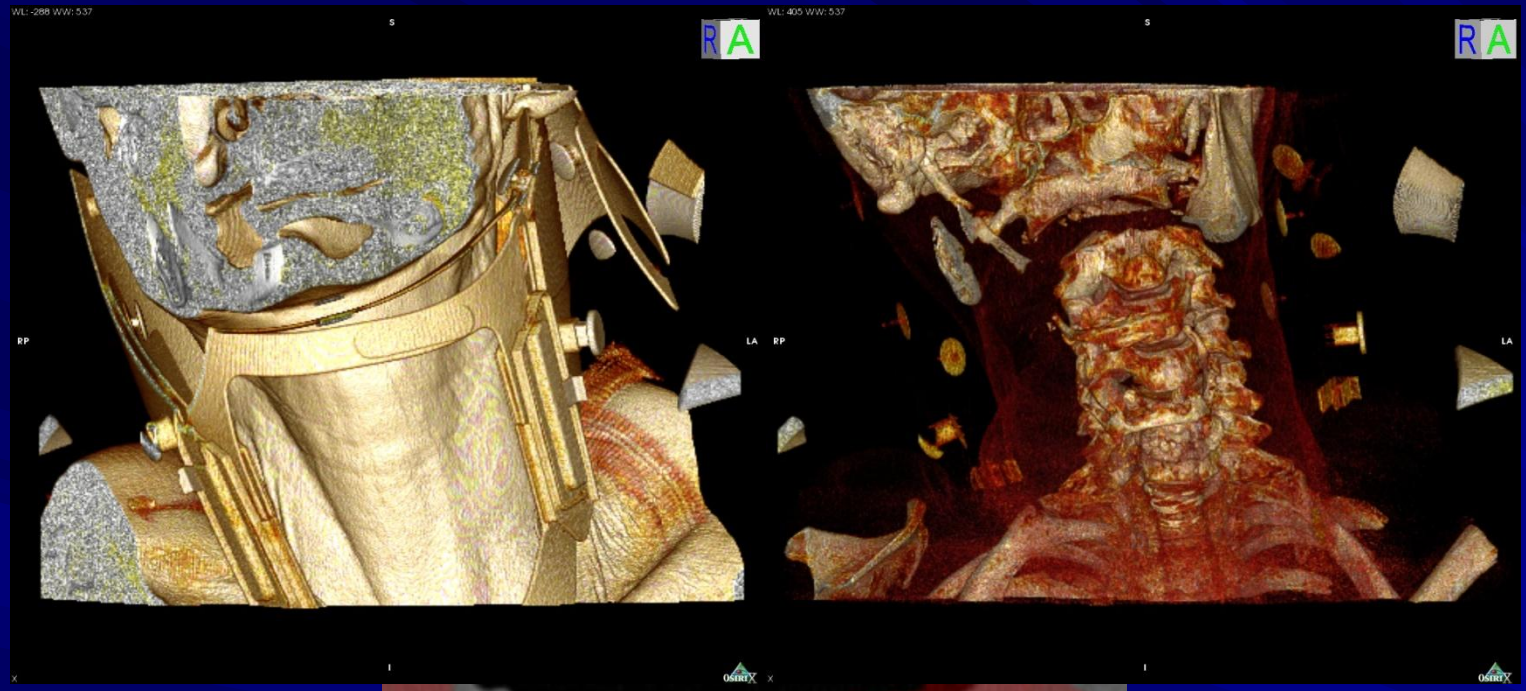
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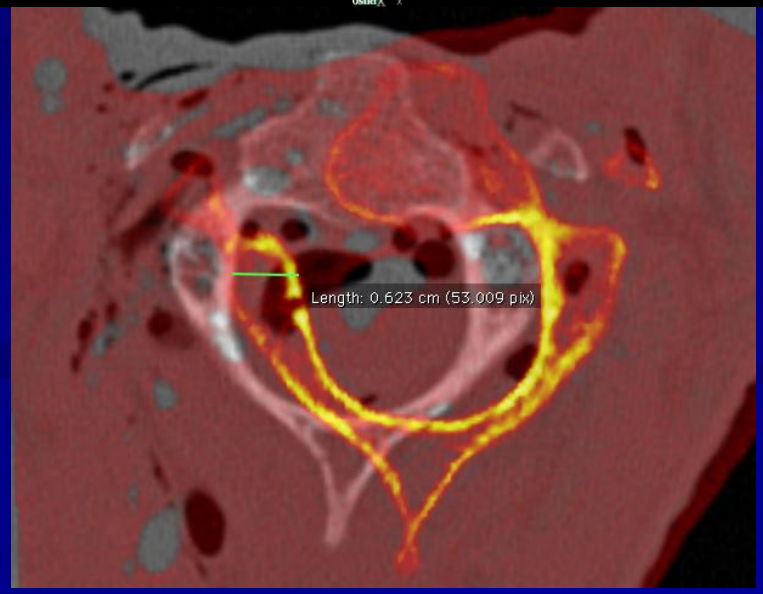
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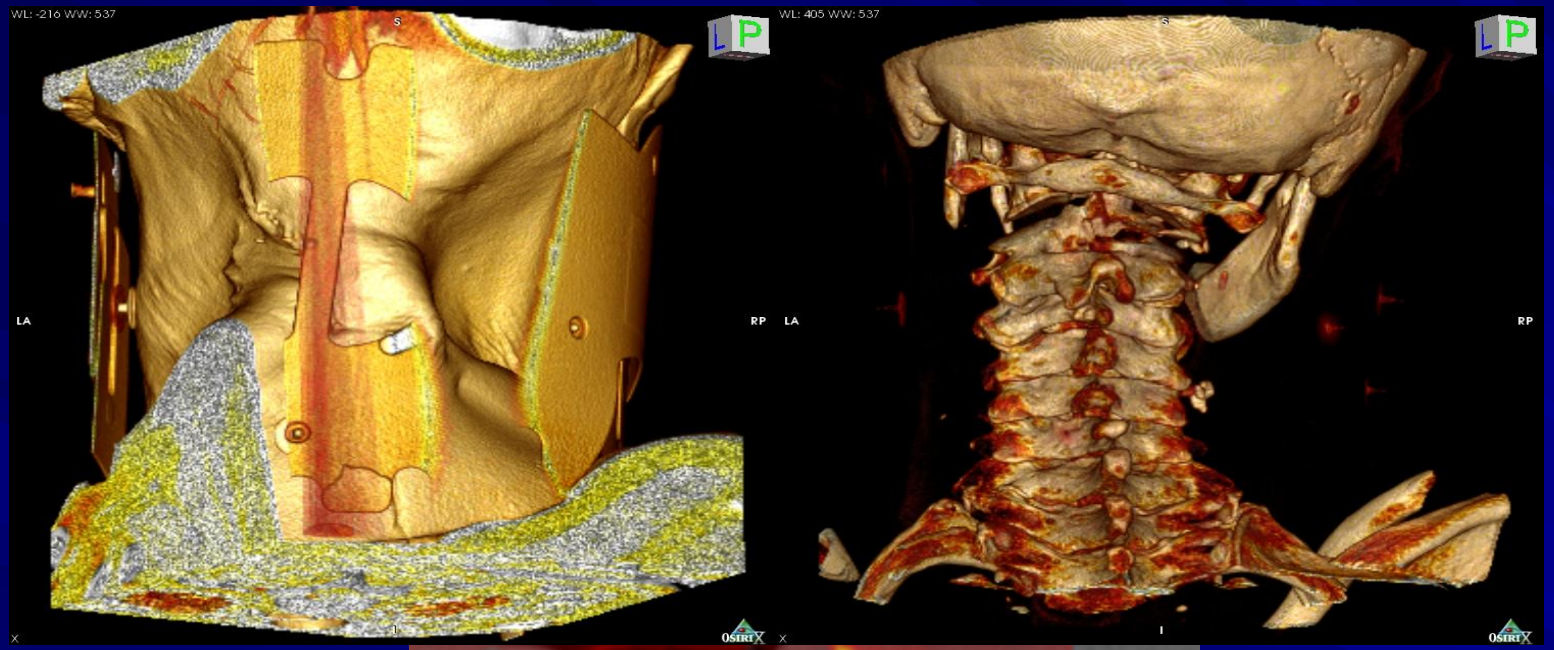
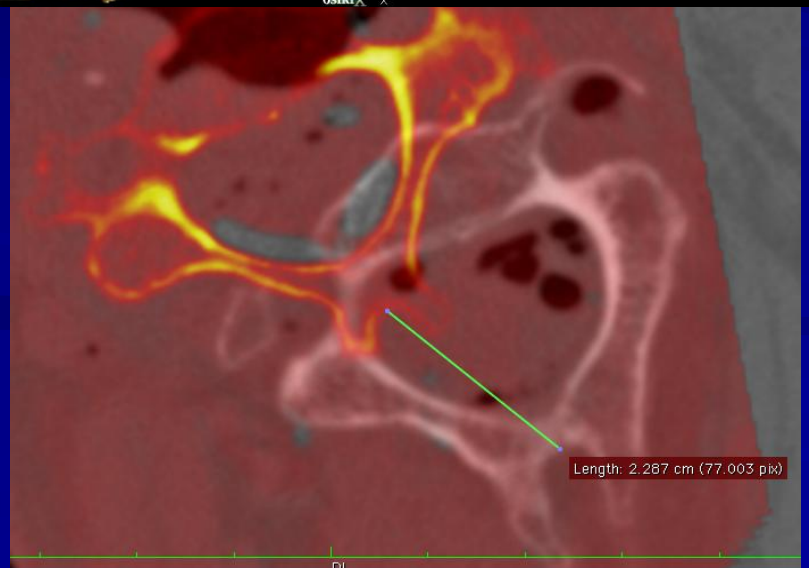
Head Hinges upon Collar Edge

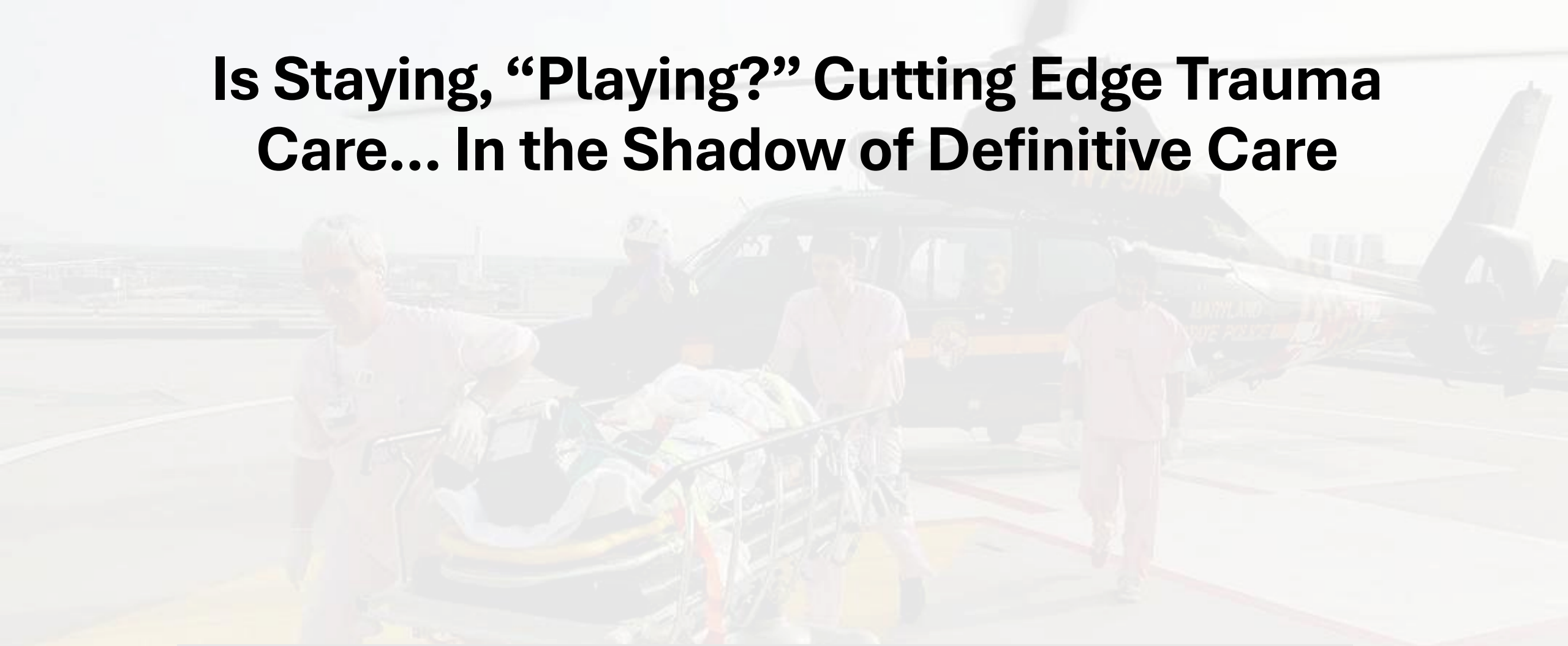




- BOTTOM LINE:
- C-Spine Injuries are low-frequency/high-criticality events.
- NO evidence to support how we care for potential c-spine patients today
- NEW evidence strongly suggests what we are doing may be harmful

- Take Away:
  - Be Selective (Using Recognized Criteria),
  - Use Properly Sized Collar
  - The Spine is NOT Protected Until the Entire Head/Neck/Thorax Complex is Immobilized.
  - The Goal Is Immobilization, Not Just Getting a Collar On.
  - Towel Rolls are Light Weight, Versatile, and Inexpensive and Effective.

Is Staying, “Playing?” Cutting Edge Trauma Care… In the Shadow of Definitive Care



Benjamin Lawner, DO, MS, EMT-P

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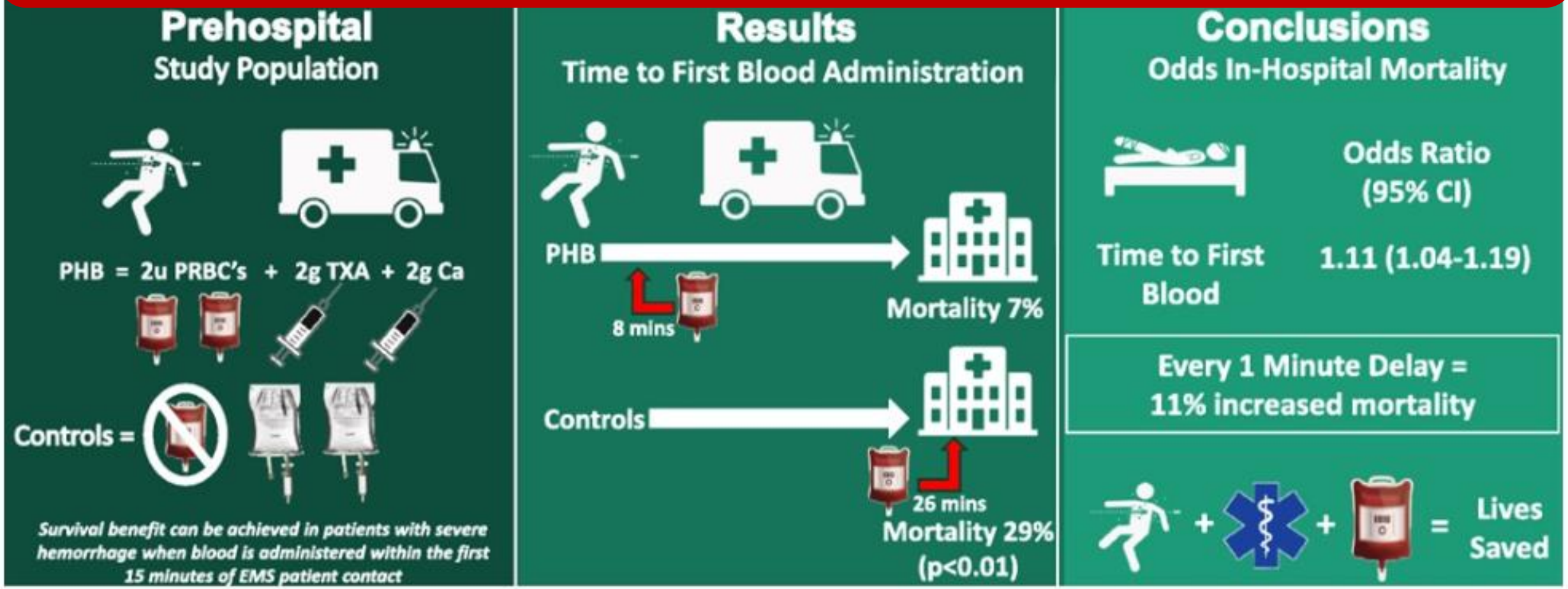
Medical Director, Baltimore City Fire Department
Medical Director, Maryland ExpressCare Critical Care Transport

- Is there a different standard of care for patients in the hospital versus those outside of the hospital?
- What components of “definitive care” are delivered by EMS clinicians and systems?
- Is there truth to the concept of the “platinum 10 minutes?”

WHY WE ARE HERE



Duchesne J CA et al. Journal of Trauma and Acute Care Surgery.
DOI: 10.1097/TA.0000000000004363

@JTraumAcuteSurg

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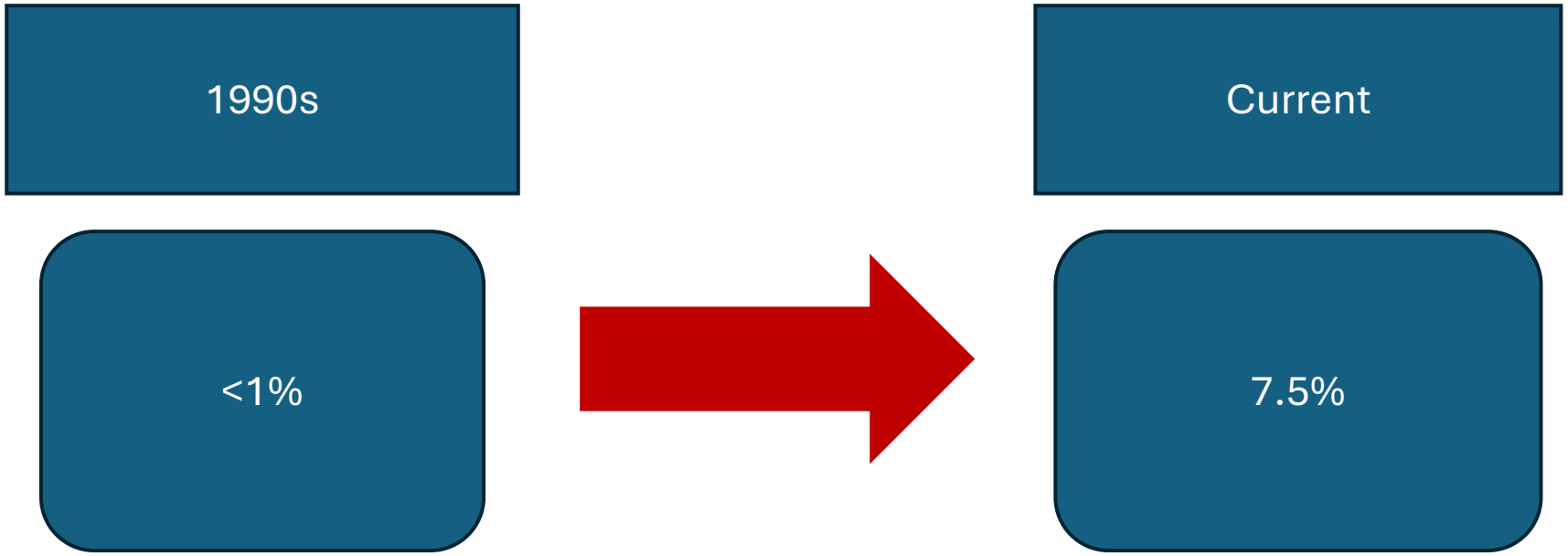
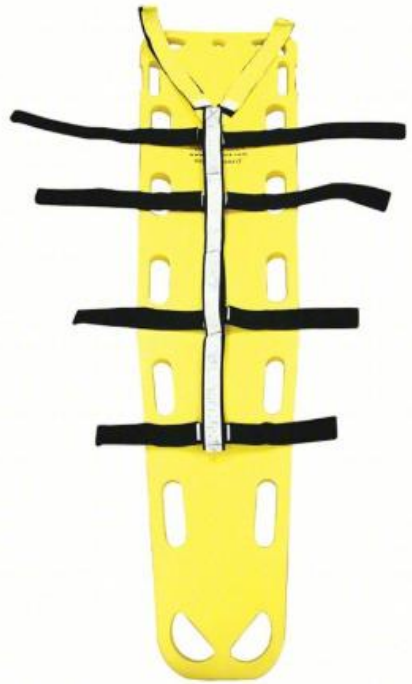
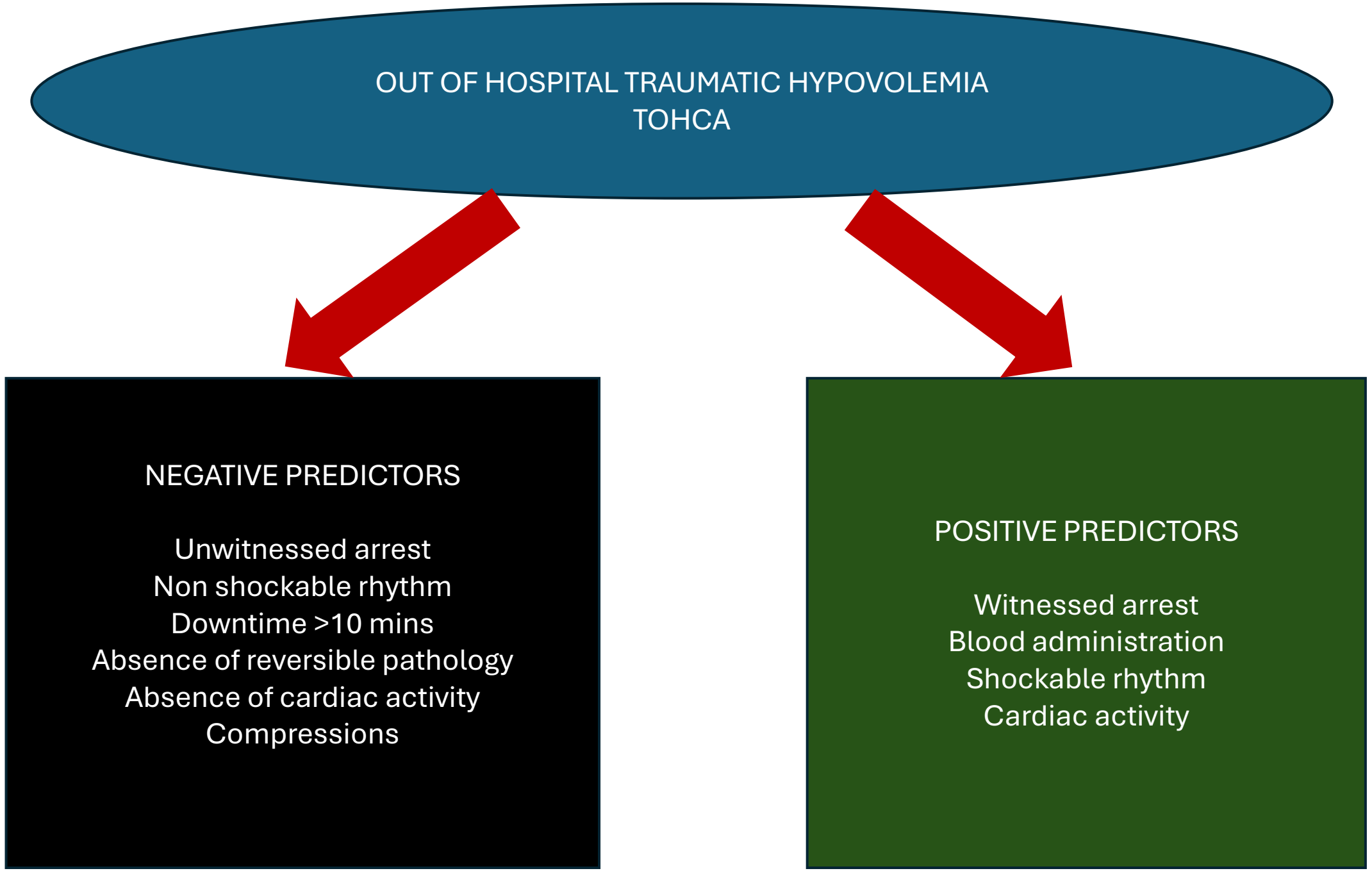


FACTS:

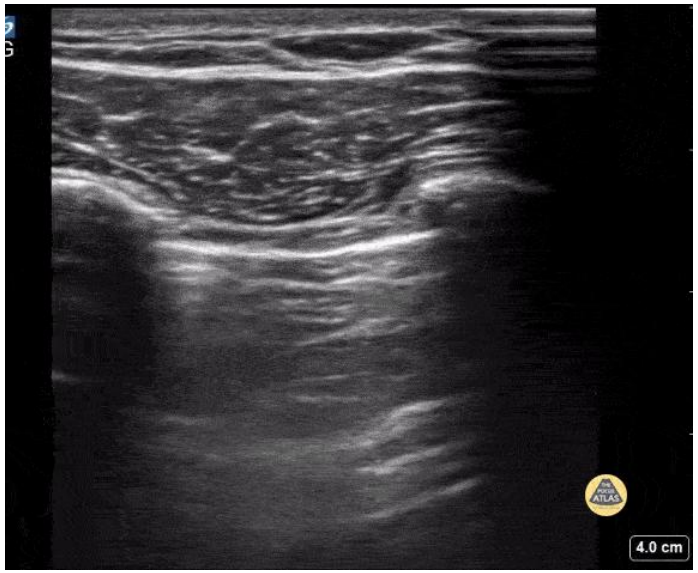
- Emergency medical services clinicals well positioned to identify survivors
- EMS well positioned to deliver definitive care
- “Staying and playing” is not “delaying” if therapies are definitive
- If survival rates approximate those of OOHCA, then we need to align resources similarly

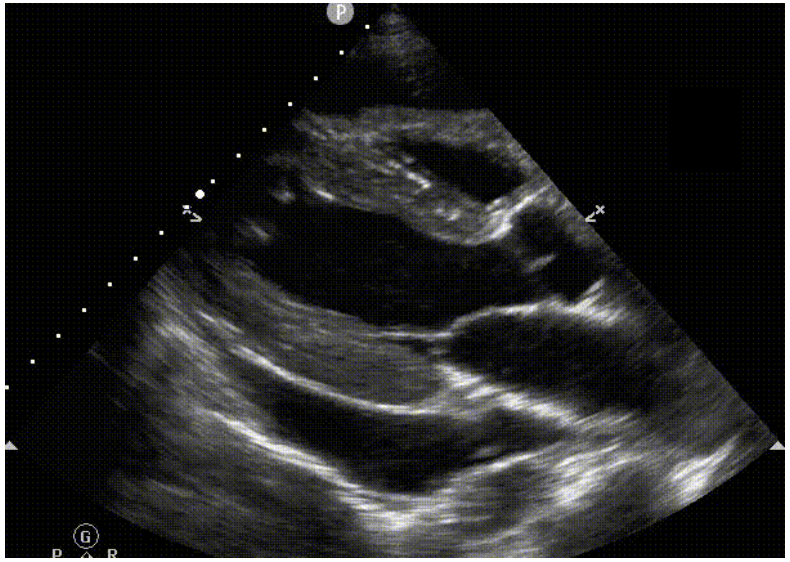
Deserves de-emphasis in traumatic circulatory arrest




OUT OF HOSPITAL TRAUMATIC HYPOVOLEMIA
TOHCA
NEGATIVE PREDICTORS
Unwitnessed arrest
Non shockable rhythm
Downtime >10 mins
Absence of reversible pathology
Absence of cardiac activity
Compressions
POSITIVE PREDICTORS
Witnessed arrest
Blood administration
Shockable rhythm
Cardiac activity

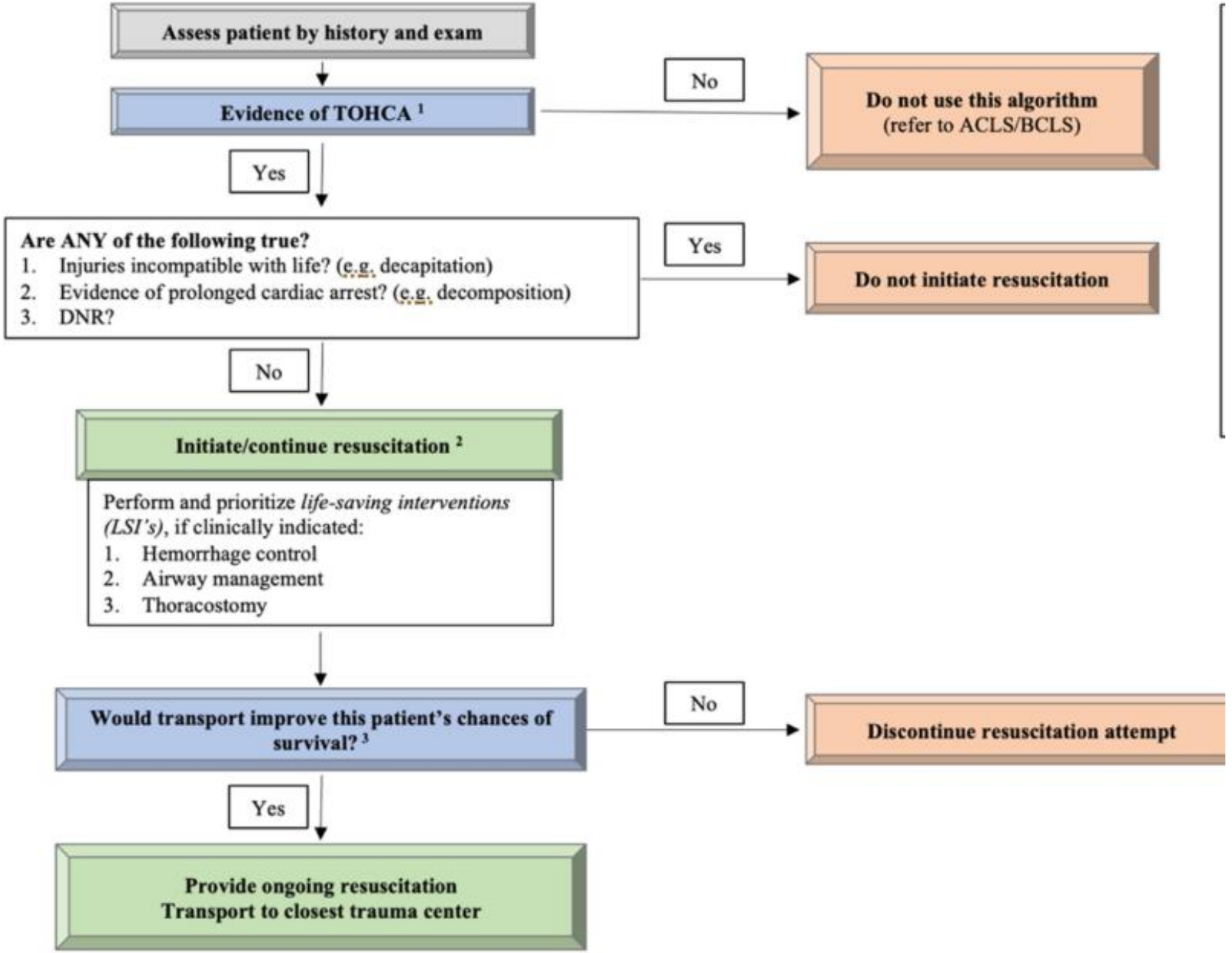
Identifying Survivors and Those Who Would Benefit



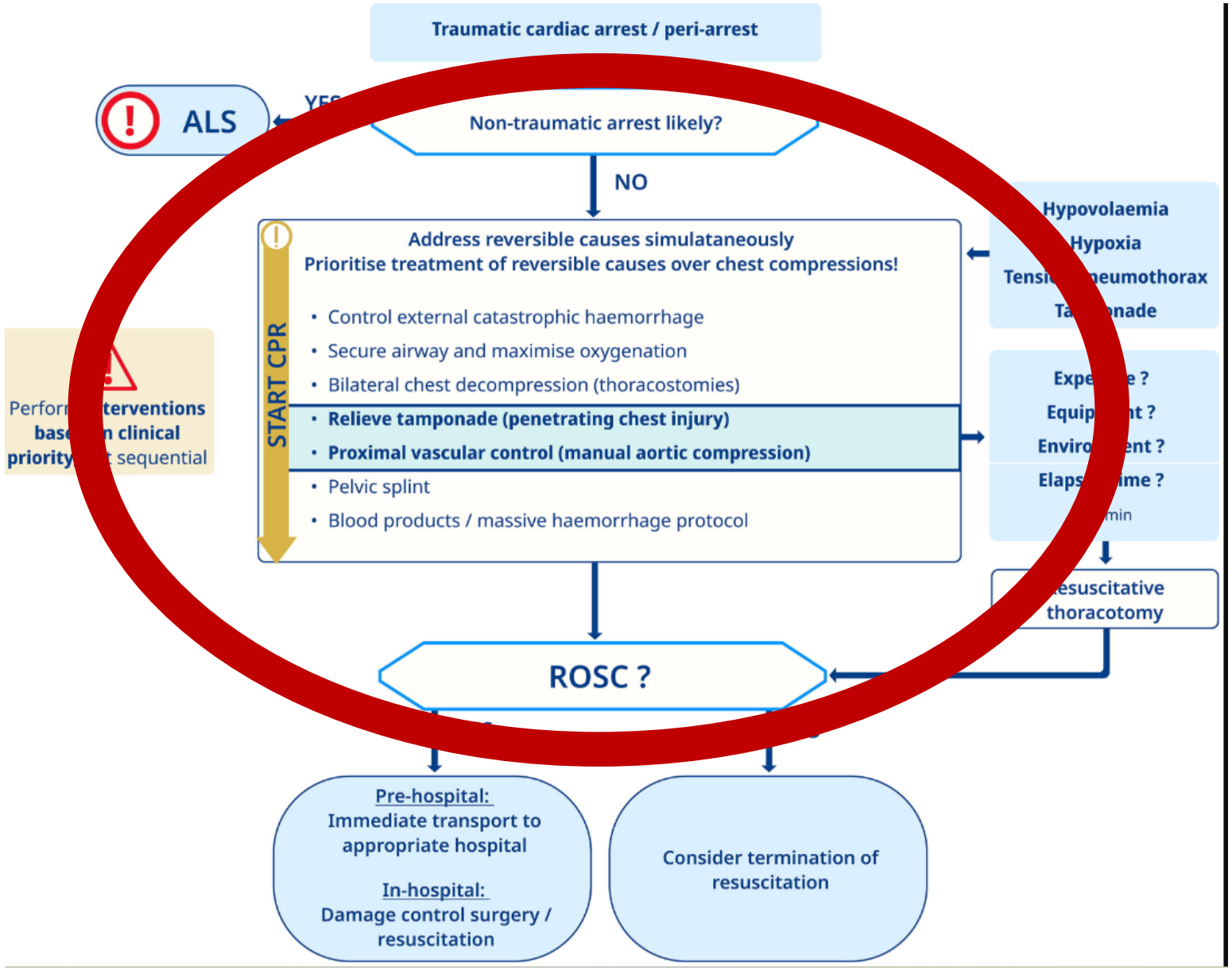


EMS clinicians capable of identifying life threats- and intervening!

PREHOSPITAL EMERGENCY CARE



RESUSCITATION
EUROPEAN RESUSCITATION COUNCIL



START CPR

Address reversible causes simulataneously
Prioritise treatment of reversible causes over chest compressions!

- Control external catastrophic haemorrhage
- Secure airway and maximise oxygenation
- Bilateral chest decompression (thoracostomies)
- **Relieve tamponade (penetrating chest injury)**
- **Proximal vascular control (manual aortic compression)**
- Pelvic splint
- Blood products / massive haemorrhage protocol

Does this stuff work ?

Original Investigation

Prehospital Resuscitative Thoracotomy for Traumatic Hypovolemia Or Circulatory Arrest

Zane B. Perkins, PhD[1,2,3]; Robert Greenhalgh, MBBS[1,3]; Ewoud ter Avest, PhD[1,3,4]; et al

» Author Affiliations | Article Information

- 610 prehospital patients
- Primary outcome survival to hospital discharge
- 88% penetrating trauma
- Arrest occurred within 12 minutes of dispatch
- Cardiac tamponade, exsanguination, or combination of both

- *30 (5%) survived to hospital discharge*
- *23/30 (76.7%) survived with favorable neurological outcome*
- *Tamponade: 22/105 (21%) survived*
- *Exsanguination 8/418 (1.9%) survived*
- *Combined pathology (0%) survived*
- *TIME DEPENDENT SURVIVAL CRITICAL*
- *Exsanguination ZERO survivors beyond 5 minutes of arrest*

Taking a Page from High Performing HEMS

1. Absence of nihilism:
Traumatic cardiac arrest (TCA) carries a very high mortality, but in those where ROSC can be achieved, neurological outcome in survivors appears to be much better than in other causes of cardiac arrest. The response to TCA is time critical and success depends on a well-established chain of survival, including advanced prehospital and specialised trauma centre care.

2. Lack of priority given to chest compressions:
Immediate resuscitative efforts in TCA focus on simultaneous treatment of reversible causes, which takes priority over chest compressions.

3. Empower clinicians

4. Identify potential survivors

5. Deliver definitive care

Relieving Your Tensions: What's the Latest Recommendations on Chest Decompression?

Eagles, 2026

Calhoun, D. Engel, T. Weston, BW.

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What are the current challenges?

- Performance when indicated = lower mortality
- Patient selection = complicated than breath sounds
- Lateral chest wall = potential benefits
  - Pleural space access
  - Rib palpation
  - Tactical environment

What do we currently know?

- Lateral chest wall = own set of challenges
  - –Site identification
  - –Procedural failure
  - –Complications
  - –Patient selection

What can we do with this?

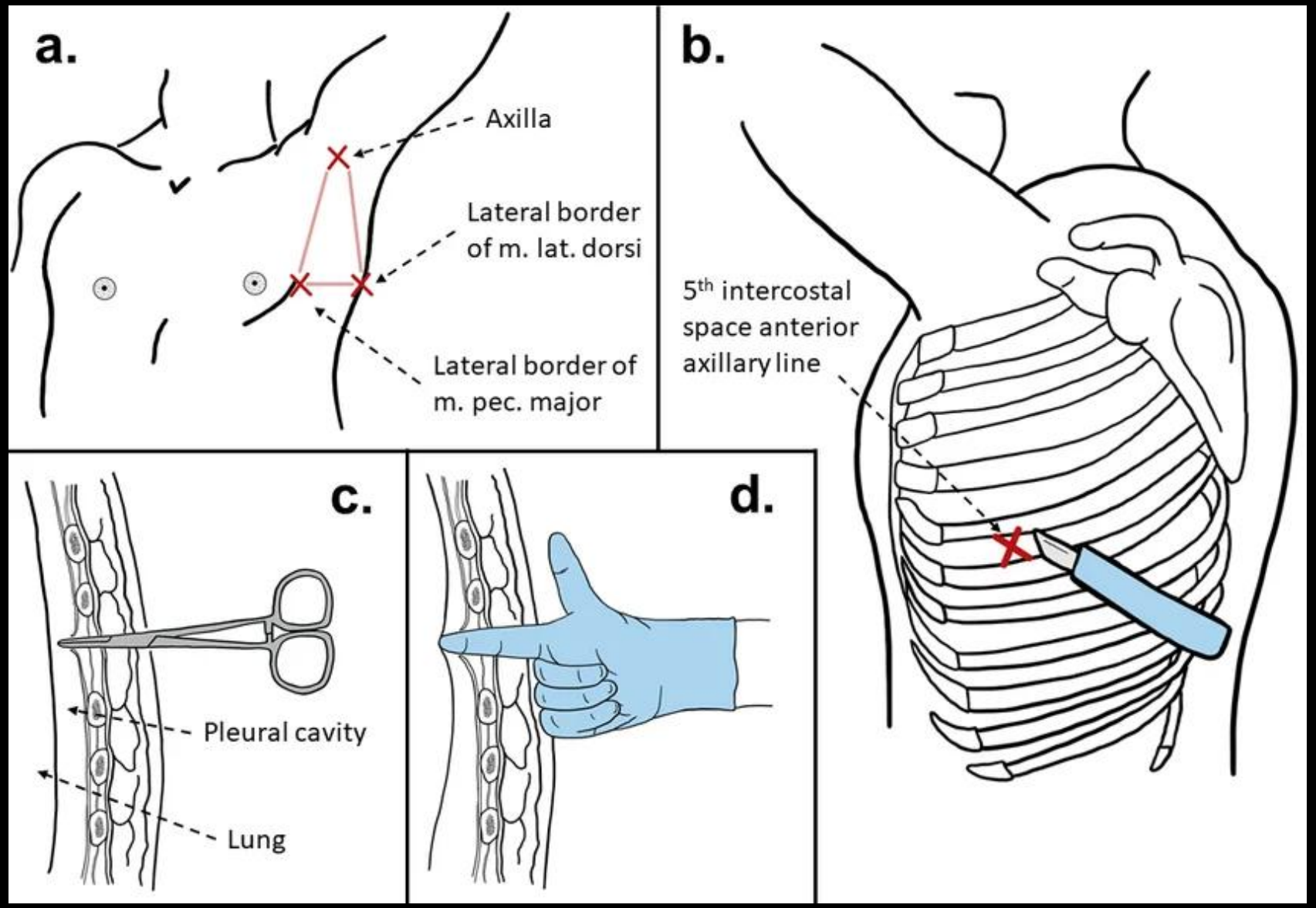
- Adjust education on patient selection
- Advance prehospital ultrasound utilization
- Focus on procedural performance
- Improve site selection with anatomy landmark devices
- Transition to finger thoracostomy?

Questions

Stein Bronsky, MD

Co-Chief Medical Director
Colorado Springs FD, AMR

Simple Thoracostomy



Results

131 Procedures

74 patients

- 15 “Peri”-Arrest
- 59 “T”OHCA

No INJURIES to Providers

1 complication

- Low & did not puncture the pleural space
- Did not lacerate the liver

Procedures confirmed by autopsy

5 ROSC

- 8.5%

7 survivors

- 4 “Peri”-Arrest
- 3 “T”OHCA

Shouldering a Sublation to Dislocation: What Are the 2026 Ways to Accomplish Joint Reductions?

W. SCOTT GILMORE, MD, FACEP, FAEMS

A Few Simple Questions

- Should we be doing this?
- When do we need to do this?
- What joints can we reduce in the prehospital setting?
- Is it safe in the prehospital setting?
- Who should be allowed to do this?

Should We Be Doing This?

- Expeditious relocation can
  - Relieve pain
    - Prolonged time to reduction (>60 minutes) has been documented to increase complications and make the injury more painful as muscle spasm increases
  - Ease reduction difficulty
    - Delay variables have been found to be the only independent predictor of reduction failure
    - Every 10-minute interval increased the odds of failed reduction attempt by 7% from time of injury to the first attempt by qualified emergency department providers
  - Reduce the persistence of related neurovascular complications

When Do We Need to Do This?

- Vascular compromise
- Nerve damage

- Regardless of trauma and concern for fracture, align anatomically and splint

What Joints Can Be Reduced in the Prehospital Setting

- Supported by Science
  - Finger dislocation
    - Digital nerve block using 2% lidocaine
  - Patella dislocation
    - Gentle anteromedial force along the lateral patella while the leg is extended
  - Anterior shoulder dislocation
    - Biomechanical techniques (positioning and muscle relaxation)
      - Cunningham, FARES, scapular manipulation, and external rotation

Is It Safe in the Prehospital Setting?

- Anterior Shoulder Dislocation
  - Alpine prehospital environment
    - 90% success for first time dislocation, 87% for recurrent dislocation
    - Concerns such as causing neurovascular or other injury during reduction appear to be unfounded when non-traction, bio-mechanical style techniques are employed
  - Ski-Patrol based Program with EMTs
    - Success rate was 88%
    - Prehospital diagnosis of ASD was 96%
      - Lower than ED physicians at 98% but higher than triage nurses at 83%
    - Sensitivity of 98%

Is It Safe in the Prehospital Setting?

- Patella Dislocation
  - EMT skill in New York state
    - 92.2% success rate over 52 different agencies
    - 68.9% of reductions done without analgesia
  - EMS in Victoria, Australia
    - Paramedic skill
    - 91.8% success rate if attempted (68.7% attempted, secondary outcome)
    - Administration of analgesia was the primary outcome
- Finger Dislocation
  - Single case report from Australia

Who Should Be Allowed to Do This?

- Emergency Medical Technicians at Wolf Creek Ski Patrol (CO)
- Nonmedical ski patrollers at Sunshine Village Ski Resort (Banff, Canada)
- EMTs in State of New York
- Paramedics in Australia
- Paramedic

References

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SCAN ME

Questions

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